This key should allow you to understand why you choose the option you did (beyond just getting a question right or wrong). More instructions on how to use this key can be found here.

If you have a suggestion to make the keys better, please fill out the short survey here.

Note: This key is auto-generated and may contain issues and/or errors. The keys are reviewed after each exam to ensure grading is done accurately. If there are issues (like duplicate options), they are noted in the offline gradebook. The keys are a work-in-progress to give students as many resources to improve as possible.

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1. Evaluate the limit below, if possible.

$$\lim_{x\to 6} \frac{\sqrt{5x-14}-4}{6x-36}$$

The solution is None of the above, which is option E.

A. 0.373

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

B. 0.125

You likely memorized how to solve the similar homework problem and used the same formula here.

C. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

D. 0.021

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

E. None of the above

* This is the correct option as the limit is 0.104.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 6$.

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2. Based on the information below, which of the following statements is always true?

As x approaches 5, $f(x)$ approaches ∞.

The solution is $f(x)$ is undefined when x is close to or exactly 5., which is option A.

A. $f(x)$ is undefined when x is close to or exactly 5.

B. $f(x)$ is close to or exactly ∞ when x is large enough.

C. $f(x)$ is close to or exactly 5 when x is large enough.

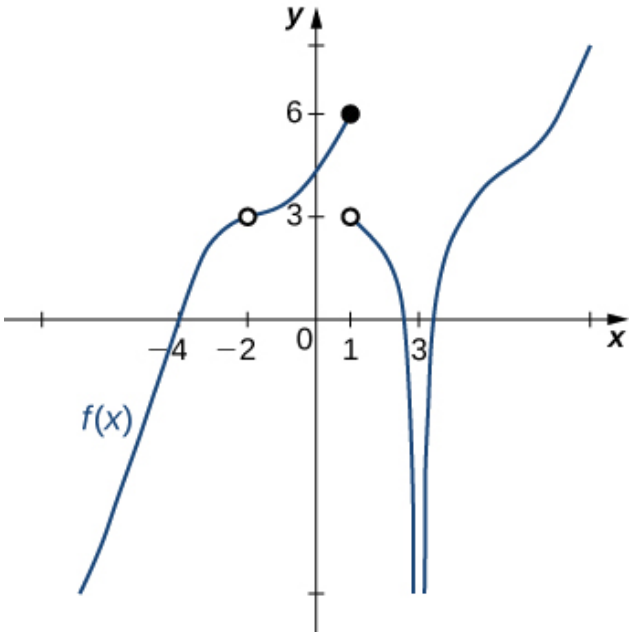
D. x is undefined when $f(x)$ is close to or exactly ∞.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach 5. It says **absolutely nothing** about what is happening exactly at $f(5)$!

---

3. For the graph below, find the value(s) a that makes the statement true: $\lim_{x\to a} f(x)$ does not exist.



The solution is 1, which is option C.

A. 3

B. -2

C. 1

D. Multiple a make the statement true.

E. No a make the statement true.

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

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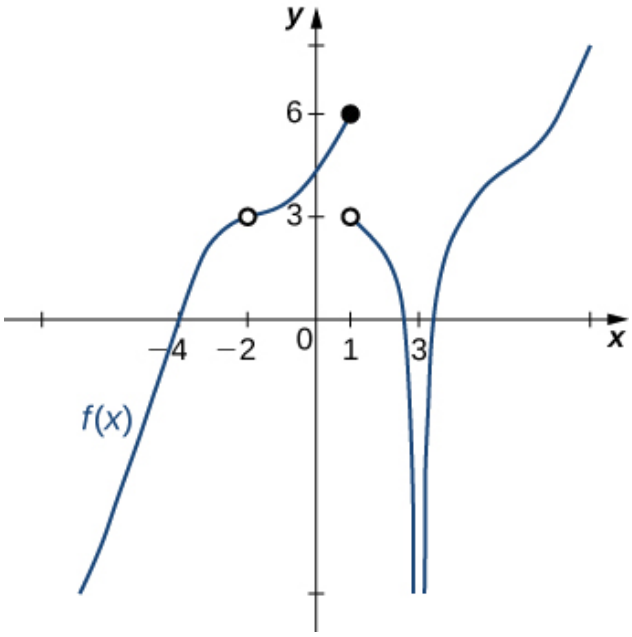
4. For the graph below, evaluate the limit: $\lim_{x \to 3} f(x)$.



The solution is $-\infty$, which is option C.

A. -2

B. 1

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General Comments: Remember that the limit does not exist if the left-hand and right-hand limits do not match.

---

5. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to -3^-} \frac{4}{(x+3)^7} + 3$$

The solution is $-\infty$, which is option C.

A. $f(-3)$

B. ∞

C. $-\infty$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

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6. Evaluate the one-sided limit of the function $f(x)$ below, if possible.

$$\lim_{x \to -3^+} \frac{4}{(x-3)^5} + 1$$

The solution is $f(-3)$, which is option C.

A. $-\infty$

B. ∞

C. $f(-3)$

D. The limit does not exist

E. None of the above

General Comment: General comments: You should be able to graph the rational function displayed. If not, go back to Module 7 to learn about the general shape of rational functions.

---

7. To estimate the one-sided limit of the function below as x approaches 4 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{4}{x}-1}{x-4}$$

The solution is $\{4.1000, 4.0100, 4.0010, 4.0001\}$, which is option E.

A. $\{3.9000, 3.9900, 4.0100, 4.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

B. $\{4.0000, 3.9000, 3.9900, 3.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

C. $\{4.0000, 4.1000, 4.0100, 4.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 4 doesn't help us estimate the limit.

D. $\{3.9000, 3.9900, 3.9990, 3.9999\}$

These values would estimate the limit of 4 on the left.

E. $\{4.1000, 4.0100, 4.0010, 4.0001\}$

This is correct!

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

---

8. Based on the information below, which of the following statements is always true?

As x approaches ∞, $f(x)$ approaches 6.955.

The solution is $f(x)$ is close to or exactly 6.955 when x is large enough., which is option B.

A. x is undefined when $f(x)$ is large enough.

B. $f(x)$ is close to or exactly 6.955 when x is large enough.

C. $f(x)$ is close to or exactly ∞ when x is large enough.

D. $f(x)$ is undefined when x is large enough.

E. None of the above are always true.

General Comment: The limit tells you what happens as the x-values approach ∞. It says **absolutely nothing** about what is happening exactly at $f(\infty)$!

---

9. To estimate the one-sided limit of the function below as x approaches 2 from the right, which of the following sets of numbers should you use?

$$\frac{\frac{2}{x}-1}{x-2}$$

The solution is $\{2.1000, 2.0100, 2.0010, 2.0001\}$, which is option A.

A. $\{2.1000, 2.0100, 2.0010, 2.0001\}$

This is correct!

B. $\{1.9000, 1.9900, 2.0100, 2.1000\}$

These values would estimate the limit at the point and not a one-sided limit.

C. $\{1.9000, 1.9900, 1.9990, 1.9999\}$

These values would estimate the limit of 2 on the left.

D. $\{2.0000, 1.9000, 1.9900, 1.9990\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

E. $\{2.0000, 2.1000, 2.0100, 2.0010\}$

If we get $\frac{0}{0}$ or $\frac{\infty}{\infty}$, the value 2 doesn't help us estimate the limit.

General Comment: General Comments: To evaluate a one-sided limit, we want to put numbers close to the limit. We can't use the limit value itself if it results in $\frac{0}{0}$ or $\frac{\infty}{\infty}$

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10. Evaluate the limit below, if possible.

$$\lim_{x\to 7} \frac{\sqrt{7x-33}-4}{6x-42}$$

The solution is None of the above, which is option E.

A. 0.021

You likely learned L'Hospital's Rule in a previous course, but misapplied it here.

B. 0.125

You likely memorized how to solve the similar homework problem and used the same formula here.

C. ∞

You likely believed that since the denominator is equal to 0, the limit is infinity.

D. 0.441

You likely tried to use a shortcut to find the limit of a function that only works for when the numerator/denominator are polynomials.

E. None of the above

* This is the correct option as the limit is 0.146.

General Comment: General comments: It is difficult to imagine the graph of this function, so you need to test values close to $x = 7$.